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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,822	08/25/2003	Hiroshi Okazaki	241806US3X	1809

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EXAMINER	
ECHELMEYER, ALIX ELIZABETH	
ART UNIT	**PAPER NUMBER**
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	03/23/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 03/23/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/646,822	OKAZAKI ET AL.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2007*.

2a)☐ This action is **FINAL**.. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 28, 2007 has been entered.

2. Claims 1-17 are pending and are rejected for the reasons given below.

Response to Amendment

3. Claims 1 and 6 were amended in the Amendment After Final filed February 2, 2007. The amendments were entered since they did not affect the scope of the claims but merely fixed informalities in the claims.

Claim Objections

4. The objections to claims 1 and 6 in the Office Action mailed November 29, 2006 are withdrawn in light of the amendments.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickman et al. (US Patent 6,465,118) in view of Okamoto (US Patent 6,045,933) and Wattelet et al. (US Patent 6,824,906).

Dickman et al. teach a thermal energy recovery system for use in a fuel processing system for a fuel cell using a heat exchange system. The heat exchange fluid undergoes several passes through different heat exchangers. Dickman et al. teach the use of water as the heat exchange fluid if there is a concern that metal ions would be introduced to the stack and storage of the water in a tank within the heat exchange reservoir (abstract; column 4 lines 27-67; column 5 lines 1-33, 43-63).

With regard to claim 13, Dickman et al. further teach the use of plate-type heat exchangers using water that can be recycled (column 3 lines 33-38).

Dickman et al. fail to teach the use of the heat exchanger to dehumidify the fuel inlet stream.

Okamoto teaches dehumidifying the fuel inlet if the moisture level in the fuel cell stack is sufficient. Okamoto teaches that the fuel inlet stream passes through a heat exchanger containing a coolant medium such as water (column 8 lines 37-53).

As for claim 7, Okamoto teaches the use of a radiator for cooling water (column 3 lines 9-18).

It would be desirable to use the heat exchanger of Dickman et al. to remove moisture from the fuel inlet stream if the moisture level in the fuel cell stack is sufficient as taught by Okamoto.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the heat exchanger of Dickman et al. to remove moisture from the fuel inlet stream if the moisture level in the fuel cell stack is sufficient as taught by Okamoto.

Dickman et al. in view of Okamoto fail to teach a laminated heat exchanger to house at least three heat exchangers, each to dehumidify inlet or outlet gases of the fuel cell.

Wattelet et al. teach a heat exchanger that includes a cathode exhaust condenser and a fuel cell stack cooler in side-by-side arrangement cooled by a common airstream (column 1 lines 44-65). Wattelet et al. further teach that this system provides increased compactness, reduction in cost because fewer parts are required, and simplified mounting. Also, the common coolant stream increases efficiency and minimizes space required (column 5 lines 49-67).

Regarding claim 5, Wattelet et al. teaches a reformer as part of the fuel cell system (column 3 lines 14-37). Further, the combustion exhaust gas heat exchanger is also taught by Wattelet et al. (see above).

It would be desirable to combine the fuel cell and heat exchange system of Dickman et al. in view of Okamoto with the heat exchanger of Wattelet et al. by integrating all of the separated heat exchange systems, for example those of the

dehumidification of the various gases required for running the fuel cell in order to increase compactness, reduce cost, and simplify mounting.

Therefore, it would have been obvious to one having ordinary skill in the art to combine the heat exchange system of Wattelet et al. with the system of Dickman et al. in view of Okamoto in order to increase compactness reduce cost, and simplify mounting.

As for claims 2-4, 6, 8-12, and 14, the combination above teaches the heat exchange system but fail to teach the exact arrangement claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the various heat exchangers to match the claimed arrangement, since it has been held that rearranging parts of an invention involves only routine skill in the art. MPEP 2144 (VI).

7. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickman et al. in view of Okamoto and Wattelet et al. as applied to claim 1 above, and further in view of Shimanuki et al.

The teachings of Dickman et al., Okamoto, and Wattelet et al. as discussed above are incorporated herein.

Dickman et al., Okamoto, and Wattelet et al. fail to teach second and third heat exchangers for removing moisture from the outlet streams of fuel and air.

Shimanuki et al. teach heat exchangers for eliminating moisture from anode and cathode outlet streams (column 3 lines 1-68; column 4 lines 1-6).

It would be desirable to remove moisture from the outlet streams of the fuel cell system of Dickman et al., Okamoto, and Wattelet et al. as taught by Shimanuki et al. since it would help to prevent moisture from condensing and causing interruption in the removal flows of the off-gases of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to remove moisture from the outlet streams of the fuel cell system of Dickman et al., Okamoto, and Wattelet et al. as taught by Shimanuki et al. since it would help to prevent moisture from condensing and causing interruption in the removal flows of the off-gases of the fuel cell.

Response to Arguments

8. Applicant's arguments filed February 2, 2007 have been fully considered but they are not persuasive.

The arguments presented are not convincing to the examiner. Applicants submit that the heat exchanger of Dickman et al. could not dehumidify the fuel inlet stream and that there is no motivation to use the heat exchanger of Dickman et al. to dehumdify the fuel inlet. The examiner disagrees.

First, Applicants argue that since Okamoto teaches a coolant medium to dehumidify the fuel inlet stream, and since the coolant medium is in direct contrast with the heat exchange medium of Dickman et al., the heat exchanger of Dickman et al. could not be used to dehumidify the fuel inlet. In fact, the coolant medium of Okamoto, specifically water, is not different from the heat exchange medium of Dickman et al.,

which is also water (column 3 lines 33-38 of Dickman et al.) Further, by removing heat from the fuel inlet stream, as the heat exchanger of Dickman et al. would be capable of doing since, as applicants point out, its purpose is to harvest thermal energy, moisture in the fuel inlet stream would condense.

Regarding the motivation to use the heat exchanger of Dickman et al. to dehumidify as taught by Okamoto, the examiner has provided motivation. On pages 3-4 of the Final Rejection dated November 29, 2006, Okamoto teaches that it is desirable to remove moisture from the fuel inlet stream if the moisture level in the fuel cell stack is sufficient. It would also be desirable to remove moisture from the fuel inlet stream of Dickman et al. if the moisture level in the fuel cell stack was sufficient. Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to remove moisture from the fuel inlet of Dickman et al. if the moisture level in the stack was sufficient as taught by Okamoto.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer
Examiner
Art Unit 1745

aee

SUSY TSANG-FOSTER
PRIMARY EXAMINER